US005529354A

United States Patent [19]

Studt et al.

[11] **Patent Number: 5,529,354**

[45] **Date of Patent: Jun. 25, 1996**

[54] **SPRING PACK ASSEMBLY**

[75] Inventors: **Timothy K. Studt**; **Benjamin L. Sheets**, both of Rice Lake, Wis.

[73] Assignee: **Wright Products Corp.**, Minneapolis, Minn.

[21] Appl. No.: **272,100**

[22] Filed: **Jul. 8, 1994**

[51] **Int. Cl.**[6] **E05C 1/08**

[52] **U.S. Cl.** **292/336.3**; 292/163; 292/DIG. 61

[58] **Field of Search** ..... 292/163, 169.19, 292/226, 336.3, DIG. 53, DIG. 61, DIG. 64, 348, 353

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,569,547	2/1986	Fayerman	292/DIG. 61
4,884,835	12/1989	Smallegan	292/DIG. 61
5,046,772	9/1991	Su	292/DIG. 53
5,125,696	6/1992	Robida	292/DIG. 61
5,177,987	1/1993	Shen	292/336.3 X
5,205,596	4/1993	Ralph	292/336.3
5,265,924	11/1993	Kim	292/336.3
5,286,074	2/1994	Lin	292/336.3
5,322,333	6/1994	Norton	292/DIG. 61
5,335,948	8/1994	Norton	292/336.3

OTHER PUBLICATIONS

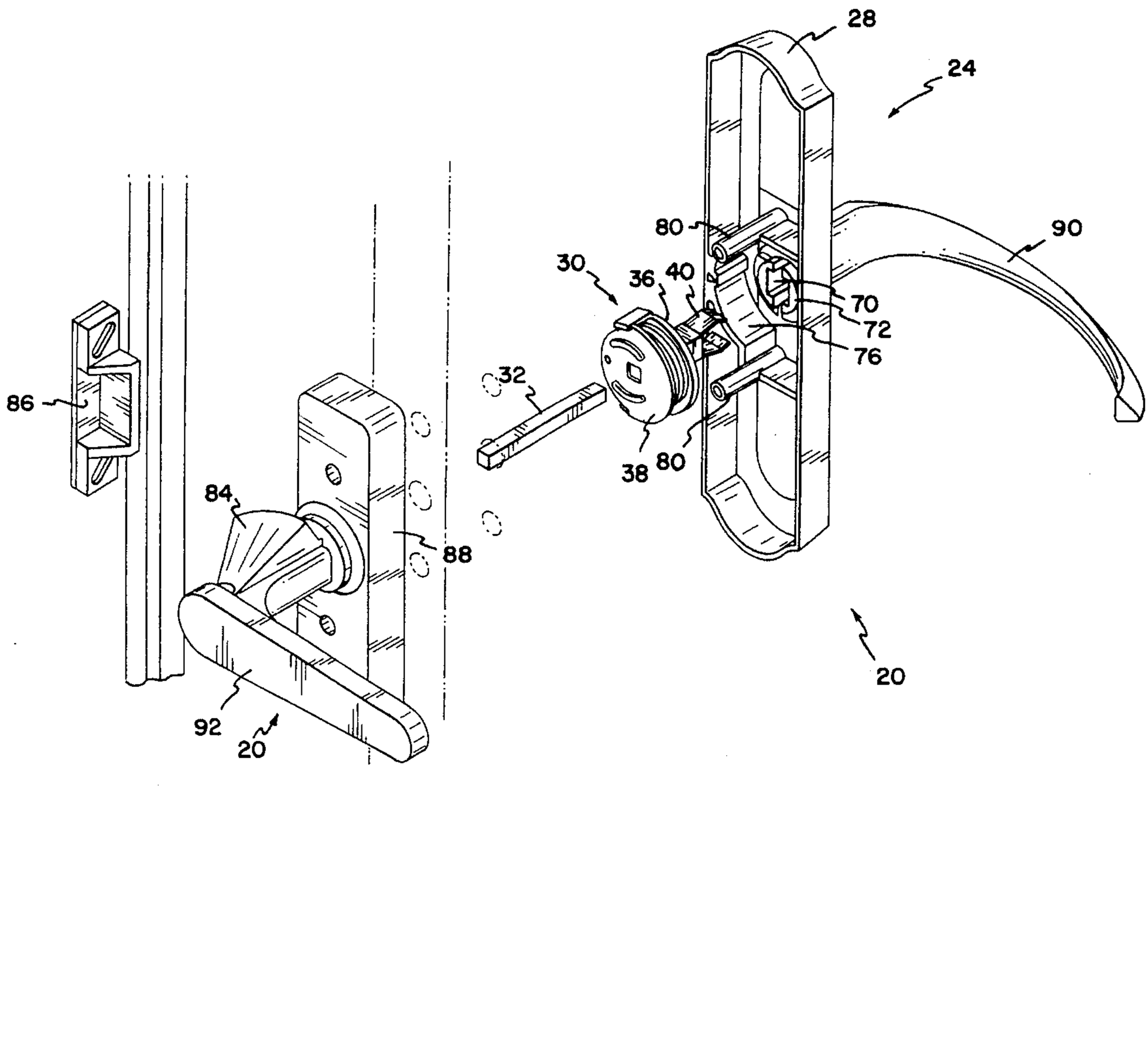
Wright Products Corp. Brochure, pp. 4–11.
Wright Products Corp. Brochure, pp. 24–27.
EXHIBIT A: Series of Drawings of Spring Pack Assembly.
EXHIBITS B, C & D: Series of Photographs of Spring Pack Assembly.

Primary Examiner—Steven N. Meyers
Assistant Examiner—Gary Estremsky
Attorney, Agent, or Firm—Merchant, Gould, Smith, Edell, Welter & Schmidt

[57] **ABSTRACT**

A latch apparatus includes a spring pack assembly for returning a latch to its normal non-use position. The spring pack assembly includes a holder portion and a cap for retaining a torsion spring. The holder portion includes retaining members and an annular member extending upward from the base of the holder for retaining and positioning the torsion spring. The adapter portion extends opposite the retaining members and annular member to receive a spindle for actuating the handle. The spring pack assembly inserts under a latch plate on the surface of the door and can be positioned so that the handle can be actuated in either direction and return to its non-use position and so that the handle can be oriented either to the left or right and either pointing upward or downward when not being used.

4 Claims, 5 Drawing Sheets



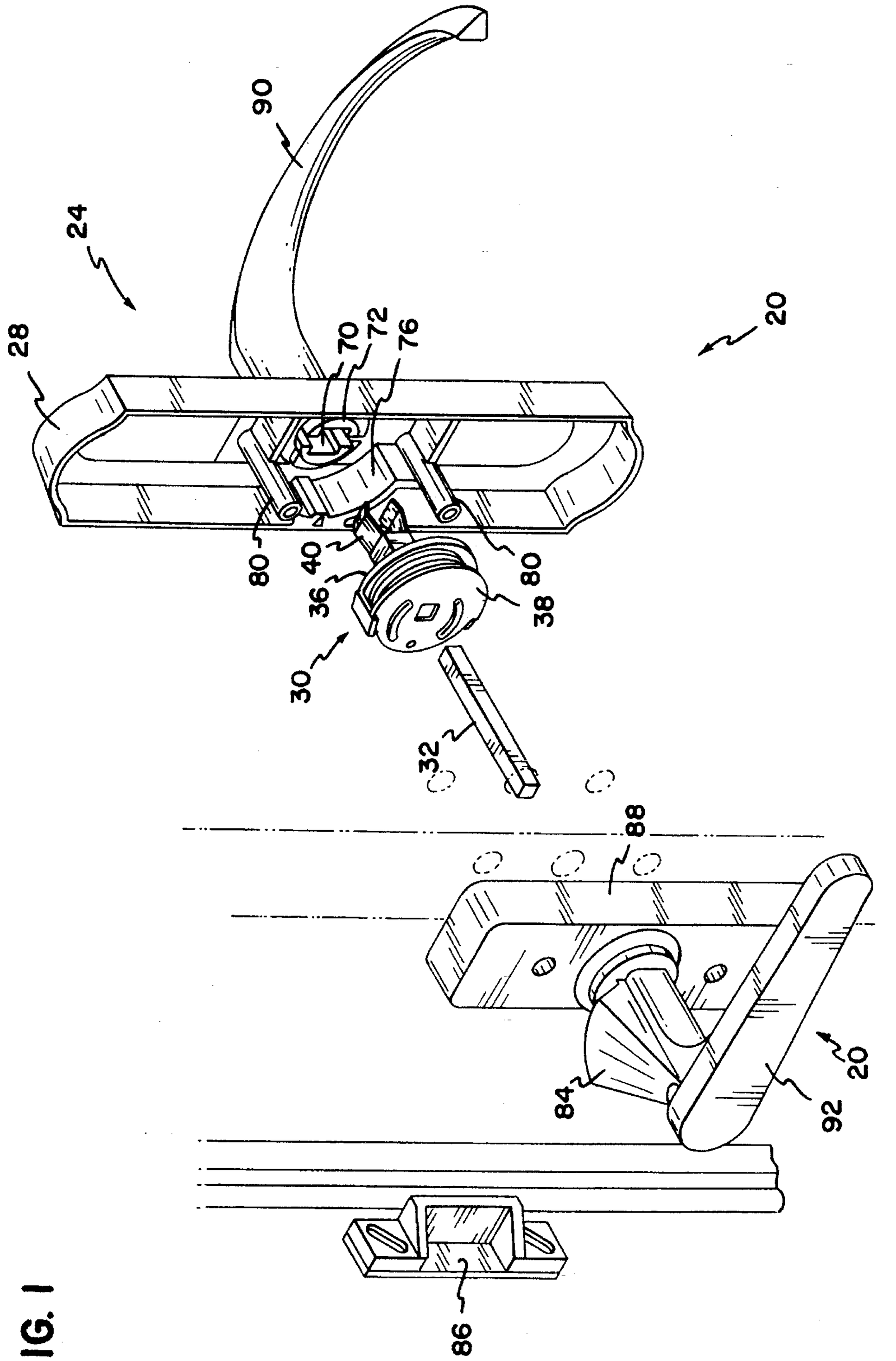


FIG. 1

FIG. 2

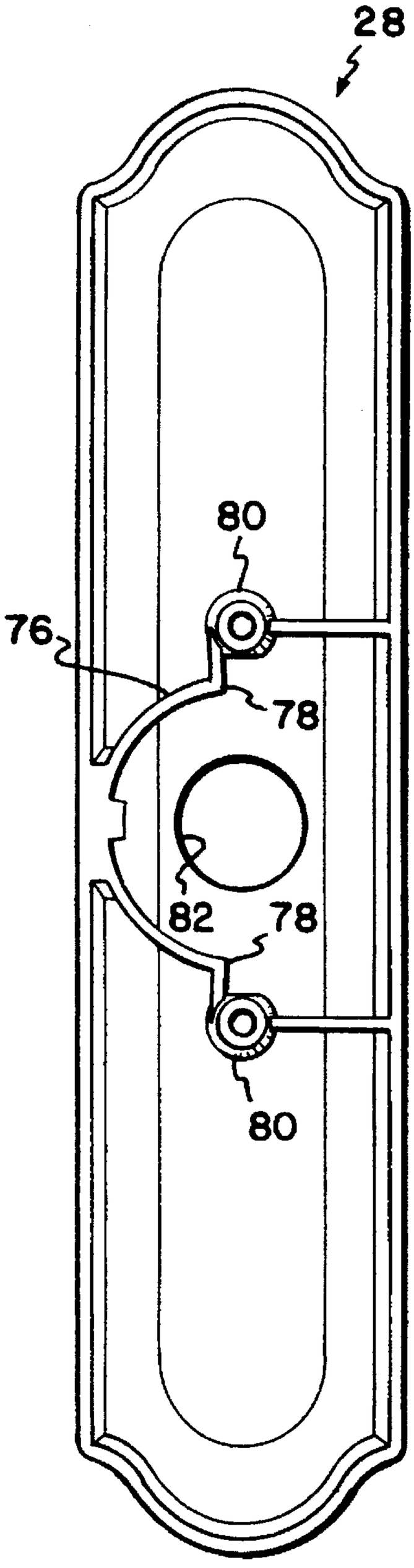


FIG. 6

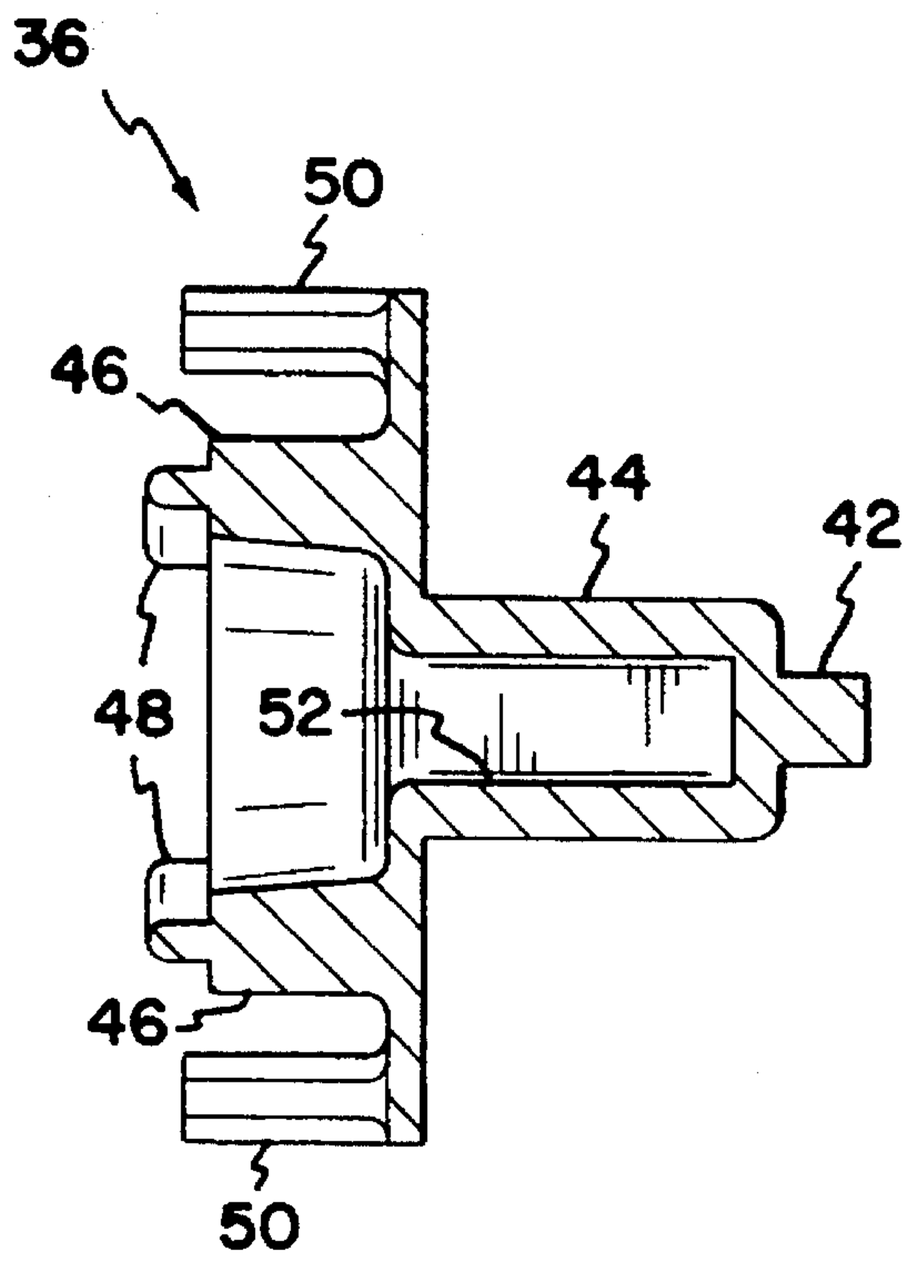


FIG. 4

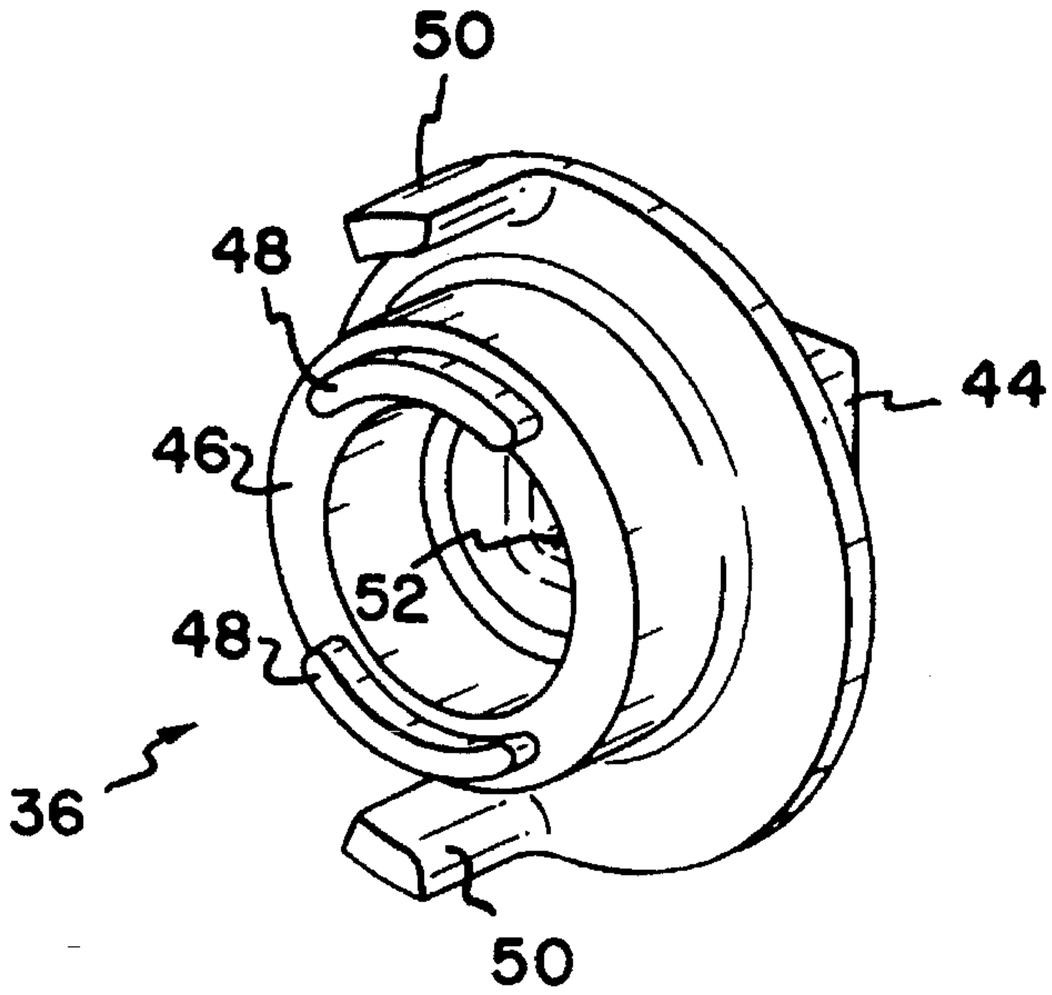


FIG. 3

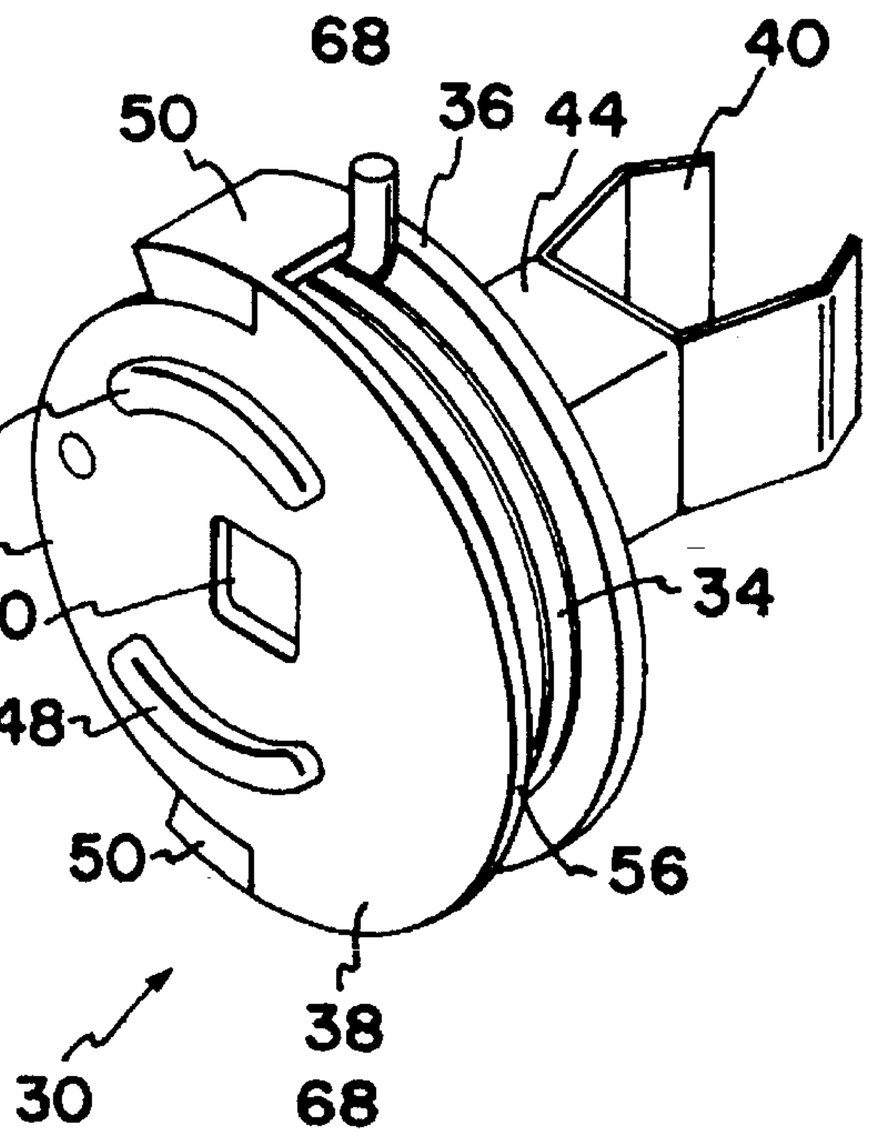


FIG. 5

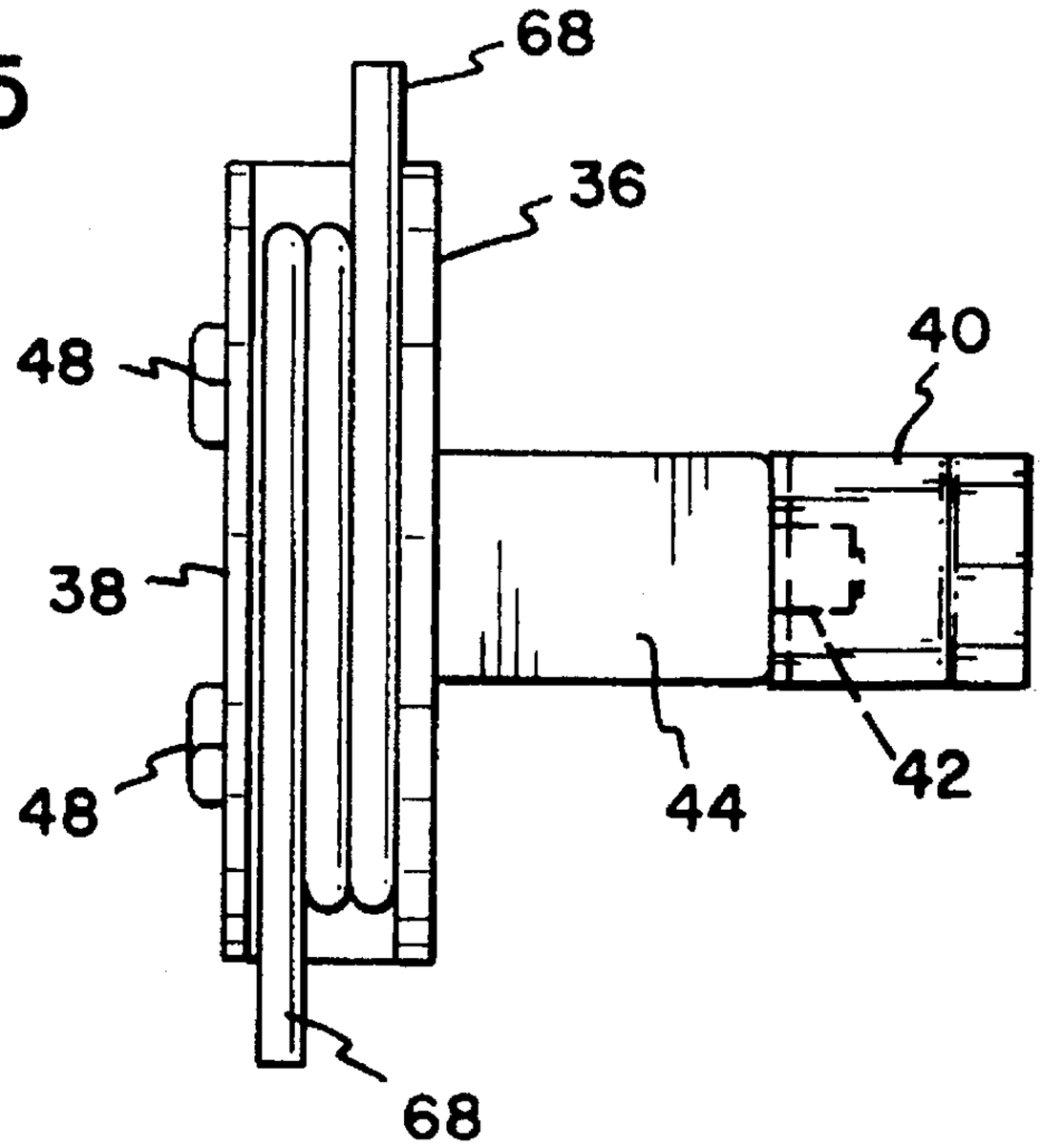


FIG. 7

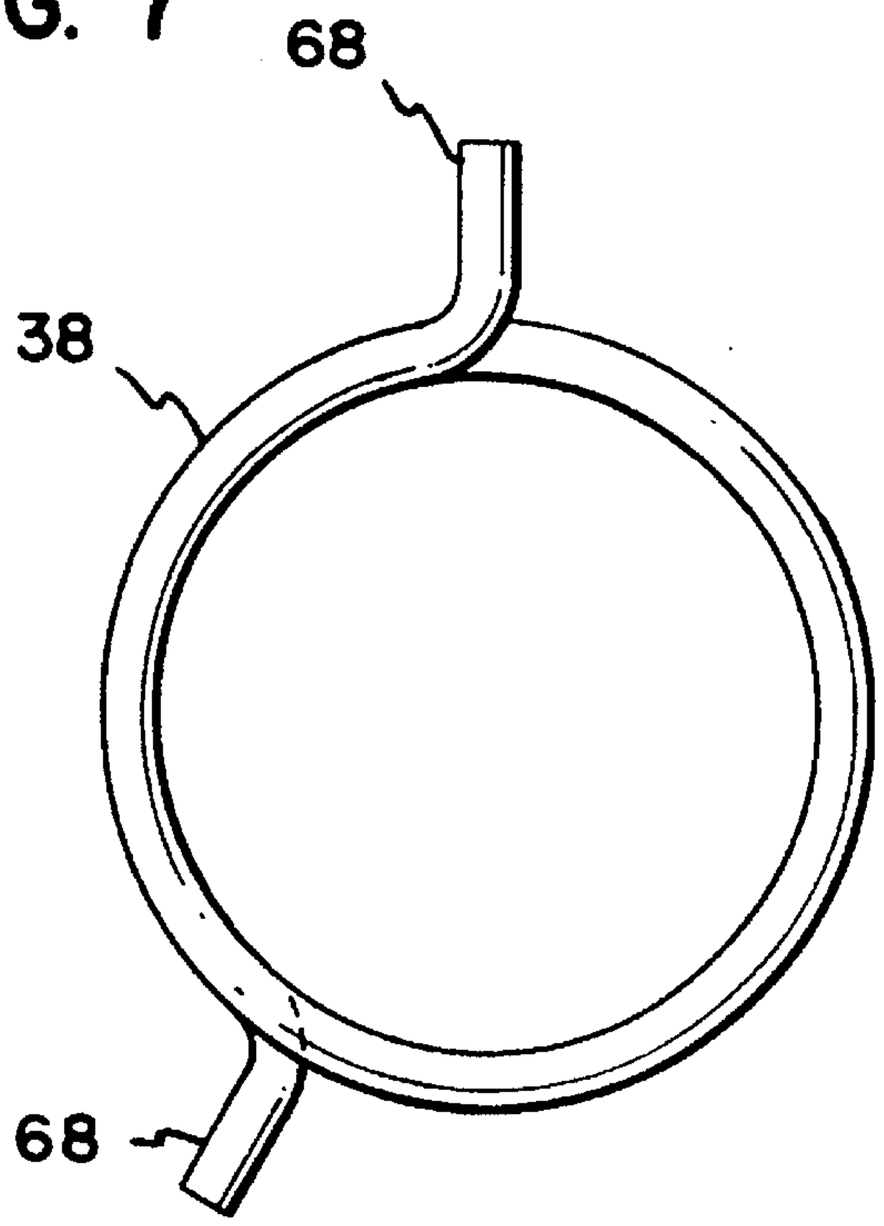
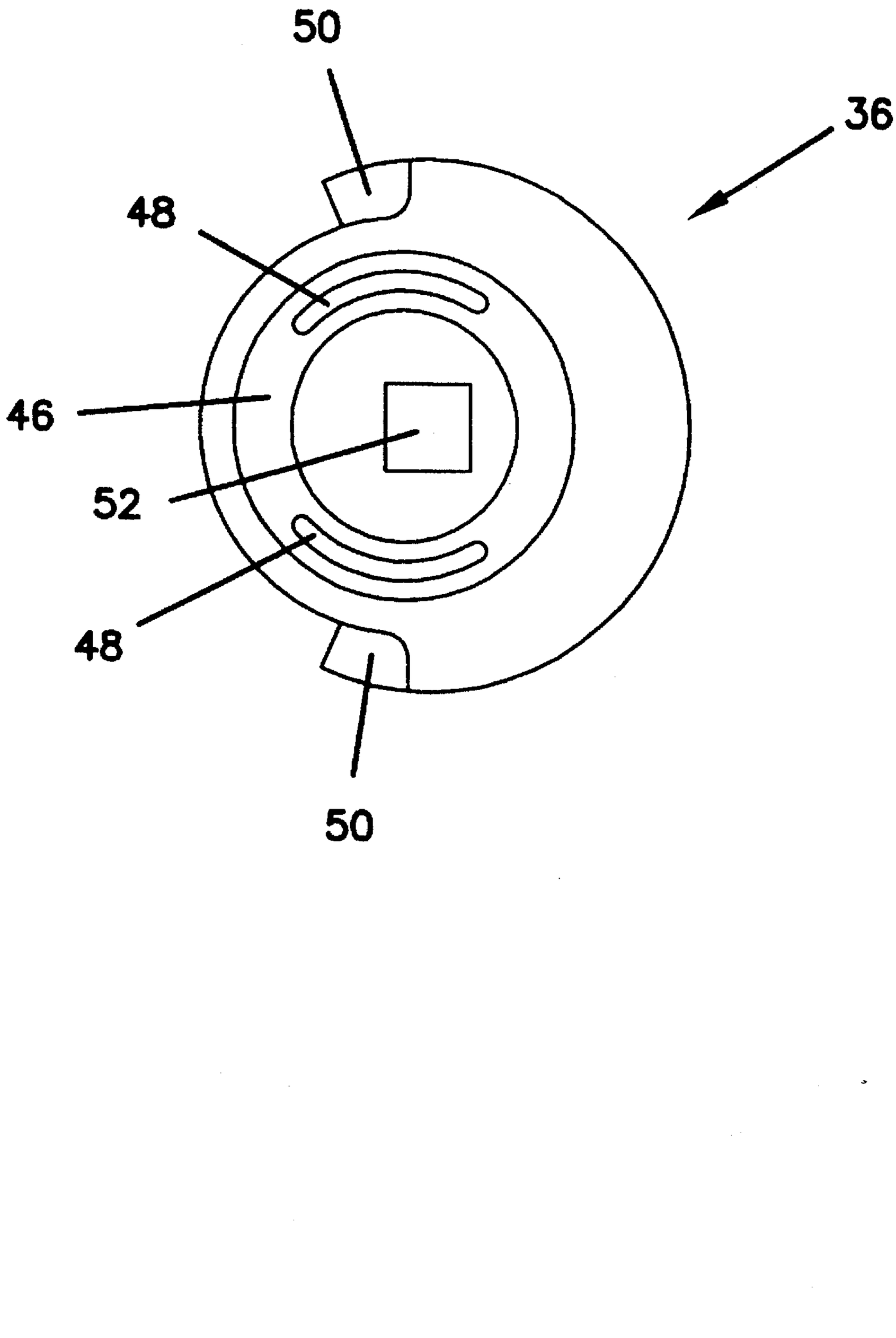


FIG. 8



SPRING PACK ASSEMBLY

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a latch apparatus and in particular to a door latch including a spring pack assembly for recentering the latch handle.

2. Prior Art

The present invention is directed to a latch apparatus, and in particular, to a spring assembly for a latch apparatus.

Latches, such as those used for doors, have been known in various forms for a very long time. Such door latches are normally actuated by rotating a lever or knob. The actuation configuration can take many different forms. For example, in some applications, a knob or lever may need to be rotated to the left to actuate, while in others, it may be necessary to actuate it to the right. In addition, in some applications, it may be necessary to have the lever extending downward and rotate up to actuate or it may be necessary to have the lever extending upward and turning down to actuate, or it may be necessary to have the lever extending to one of the sides and rotating either up or down to actuate.

Latch handles, including both levers and knobs, are often mounted on a spindle which also actuates the handle. However, a common problem with this configuration is that the connection to the spindle can loosen with time and use. In addition, a separate adapter piece must be placed on the spindle to connect the handle. This connection may also loosen over time. The knob or handle often droops and may even fall off of the spindle, rendering the latch and handle unusable.

Another problem associated with the use of latches is the need to do substantial modifications on the door and create space within the door to receive the mechanism for the latch. This is very time consuming and runs the risk of a mistake being made and thereby ruining the door. Existing latches also require significant procedures for installation. This increases time required for the installer and increases risk for incorrect installation.

Known latch devices require a separate handle and spring configuration to accommodate different uses, different mounting positions, and different types and direction of actuation. This can lead to greater production costs, greater numbers of parts being needed as each use may need different elements, and more difficult installations.

It can be seen then, that a new and improved latch is needed which can use the same components for various mounting positions and various types of actuation. It can also be appreciated that such a latch is easier to mount if the components can be mounted on the exterior of the door with minimum modifications to the door. The latch should have a handle return which allows the knob or handle to be turned in either direction, yet returns the handle to its normal non-use position. In addition, the latch should have a knob or handle which is not mounted and supported on the return mechanism, so that it does not droop or fall. The present invention addresses these and other problems associated with door latches.

SUMMARY OF THE INVENTION

The present invention is directed to a latch apparatus and in particular to a latch apparatus incorporating an improved spring pack assembly. The latch generally includes an inner and outer handle with one of the handles having a cammed

retainer member engaging a complementary portion mounted on the door frame. A latch plate is mounted on one side of the door and has a handle lever rotatably mounted to the latch plate. The latch plate also houses the spring pack assembly so that no parts need to be mounted inside the door. Therefor, less work is done to the door and greater mounting flexibility is achieved without requiring additional parts. A spindle connects the levers of the latch through the spring pack assembly for actuation. The door only requires an orifice formed therethrough for receiving the spindle and may include other orifices for mounting, but requires no other modifications to accommodate the present invention. In addition, the assembly of the latch is simplified. To install, the handle is positioned, then the spring pack is inserted into place. Because of the configuration of the adapter, handle and latch plate, the spring pack cannot be inserted incorrectly.

The spring pack assembly includes a holder portion and a cap portion which mount together to retain a torsion spring having tabs extending radially outward therefrom. The holder portion includes an annular raised member extending upward from a substantially flat circular base. Opposite the annular portion is an adapter portion extending to receive the spindle. The adapter portion also includes a retainer clip for holding the spring pack in place. The retainer clip holds the spring pack away from the door to prevent rubbing on the door. The adapter portion and retainer clip insert into the lever for rotatably connecting therewith. The adapter includes an orifice, preferably a square orifice to receive the spindle which is also square in a preferred embodiment. The holder also includes tab retaining members at a periphery of the base portion extending upward to the cap portion. The torsion spring is mounted so that the tabs are slightly biased against the tab retaining members of the holder.

The latch plate includes a curved spring pack assembly retaining portion for receiving the spring pack assembly with corners at both ends of the curved portion. The spring pack holder base and cap both have a larger diameter portion and a smaller diameter portion for fitting into the latch plate with the smaller diameter portion engaging the curved retaining portion of the latch plate. In this manner, the spring pack assembly is always properly held and aligned. When properly aligned, the tabs of the spring also are proximate the corner portions of the curved retainer plate. In this manner, when the latch is actuated and the spring pack assembly is turned, one spring tab member is forced against a tab retaining member of the spring pack assembly while the opposite tab engages one corner of the retainer plate. A biasing force moves the handle levers back to their original position. When the handles are actuated in the opposite direction, the tab roles are reversed and the spring bias again returns the latch to its original position.

It can be appreciated that with the present invention, the handle lever may be rotated to four positions to accommodate the adapter and the retainer clip. The square orifice in the handle receiving the square adapter and retainer clip can be rotated 90 degrees to change the nonactuated position of the main lever. It can be appreciated that with this configuration, the handle may be normally positioned pointing either up or down or either to the left or the right. This allows great flexibility for a variety of uses without additional modifications to the handle or door.

These and various other advantages and features of novelty which characterize the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for a better understanding of the invention, its advantages, and the objects obtained by its use, reference

should be made to the drawings which form a further part hereof, and to the accompanying descriptive matter, in which there is illustrated and described a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, wherein like reference letters and numerals indicate corresponding structure throughout the several views:

FIG. **1** shows an exploded perspective view of a latch for a door including a spring pack assembly according to the principles of the present invention;

FIG. **2** shows an elevational view of the inside of a latch plate for the latch shown in FIG. **1**;

FIG. **3** shows a perspective view of the spring pack assembly for the latch shown in FIG. **1**;

FIG. **4** shows a perspective view of the spring pack holder for the spring pack shown in FIG. **3**;

FIG. **5** shows a side elevational view of the spring pack assembly shown in FIG. **3**;

FIG. **6** shows a side sectional view of the spring pack assembly holder shown in FIG. **4**;

FIG. **7** shows a top plan view of a torsion spring for the spring pack assembly shown in FIG. **3**; and,

FIG. **8** shows an end elevational view of the spring pack holder shown in FIG. **4**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

Referring now to the drawings, and in particular to FIG. **1**, there is shown a latch apparatus, generally designated **20** which is utilized with a door shown in phantom. The latch **20** includes an outer portion with a latch handle **24** including a lever **90** and an inside portion including an inner handle **26** with a lever **92**. Although levers **90** and **92** are shown, it can be appreciated that knobs or other actuating members may be utilized. In addition to the outer handle **24**, is a latch plate **28** mounts on the surface of the door (shown in phantom) including a spring pack assembly **30** housed substantially within the latch plate **28**. A square spindle **32** connects the inside handle **26** through the spring pack **30** to the outside latch handle **24**. The outside handle **24** includes a receiver **72** with a square orifice **70** for receiving a retainer clip member **40** mounted on the spring pack assembly **30**. The retainer **40** presses against the receiver **72** and holds the spring pack assembly **30** in place. The inner handle **26** mounts to the door on a mounting block **88** and includes a cammed latching member **84** formed thereon which engages a retainer block **86** which forms a cavity with the door frame for receiving the latching member **84**.

The latch **20** mounts to the door with bolts extending through the mounting block **88** to bosses **80** on the latch plate **28**. It can be appreciated that with the present invention, only three holes need to be formed in the door, one for the spindle **32** and two for the bosses **80**.

In FIG. **7**, there is shown the torsion spring **34**. At each end of the spring is a tab **68** extending radially outward for engaging portions of the spring pack assembly **30** and latch plate **28**, as explained hereinafter. The tabs **68** are positioned more than **90** degrees apart but less than 180 degrees for positioning the spring **34** and positioning the spring pack assembly **30**. The spring **34** has a diameter larger than the annular member **46** but less than the distance between retainer members **50**.

Referring to FIGS. **3–6** and **8**, the spring pack assembly **30** is shown. The spring pack assembly **30** includes a holder member **36** and a cap member **38** which retain and hold a torsion spring **34**. The holder member **36** includes an adapter **44** extending downward from the base of the holder **36** and a mounting finger **42** for mounting the retainer clip **40** thereon. With the present holder **36**, the adapter portion **44** is integral with the holder **36**. The holder **36** and adapter portion **36** and **44** include a square cavity **52** formed therein for receiving the spindle **32**. In addition, the holder **36** also includes a raised annular spring positioning member **46** configured to insert inside the spring **34**. The raised member **46** includes raised curved portions **48** inserting through corresponding curved orifices in the cap member **38**. The annular raised member **46** is offset from the center of the spring pack **30** for positioning and holding the spring **34**. At an outer portion of the holder **36** stop acting as tab retainer members **50** for holding and positioning the end tabs **68** of the spring **34**. The spring tabs **68** are positioned and biased against the tab retainer members **50** and held by the annular member **46**. With the present configuration, the spring tabs **68** press against the retaining members **50**. This pushes the spring **34** away from the retaining members **50** and would move the spring **34** to a position off center from the spring pack **30**. The annular member **46** is placed off center from the spring pack **30** toward the retaining members **50**. The annular member **46** engages the inside of the spring **34** and prevents the spring **34** from moving off center, maintaining proper alignment and ensuring proper spring function. As shown in FIG. **3**, it can be appreciated that the cap member **38** and the base of the holder member **36** which have a similar periphery both include a larger diameter portion **56** and a smaller diameter portion **54** for positioning the spring pack assembly **30** on the latch plate **28**, as explained hereinafter.

Referring now to FIG. **2**, there is shown the latch plate **28**. The latch plate **28** includes an orifice **82** for receiving rotating receiver **72** of the handle **24** which accepts the adapter portion **44** and retainer clip **40** of the spring pack assembly **30**, as shown in FIG. **1**. Referring again to FIG. **2**, the latch plate **28** also includes a curved spring pack retaining member **76** which has a radius configured to engage the smaller diameter portions **54** of the spring pack assembly **30**. In addition, bolts or screws for mounting the latch plate to the door insert through the bosses **80**. At the ends of the curved spring pack holder **76** are corner portions **78** which engage the spring tabs **68** for positioning the handles.

To mount the handle **24**, it is positioned either pointing vertically upward, pointing vertically downward, or pointing right or left. The handle lever **90** position can be changed by rotating it 180 degrees or 90 degrees in either direction prior to insertion of the spring pack assembly **30**, adapter **44** and spring clip **40** into the orifice **70**, as shown in FIG. **1**. It can be appreciated that the spring pack assembly **30** mounts in the same single position, but that the handle lever **90** can be rotated to any of its positions as required by the geometry of the door and frame. In this manner, the handle lever **90** may be used for either left or right opening doors and also for positions wherein the handle must point upward or downward. It can also be appreciated that since the handle **24** mounts directly to the latch plate **28** rather than being supported by the spindle, there is no possibility that the handle **24** might loosen from its connection to a spindle and droop. With the present invention, a more secure mounting arrangement is achieved.

When the latch **20** is mounted, the latch plate **24** is pressed tightly against the door with the inner handle mounting

block **88** pressed against the door on the opposite side. It can be appreciated that the tabs **68** of the spring **34** will be pressed against both of the retainer members **50** on the spring pack assembly **30**. It can also be appreciated that the tabs **68** are proximate the corners **78** on the curved spring pack retainer **76** of the latch plate **28**. Therefore, should the handle **24** be actuated in one direction or the other, the tabs **68** of the spring will center the handle levers **90** and **92** back towards their original position and also close the latch **20**. Since the spring pack assembly **30** is rotatably mounted with the spindle **32** and the rotating member **72** of the handle, rotation of either handle lever will also move the spring pack assembly **30**. However, rotation deforms the spring **34** so that there is a bias resisting the movement from the centering position. In particular, one tab **68** will be engaging a corner **78** of the spring plate holder **76** while the opposite tab **68** will be engaging the retaining member **50** in the spring pack assembly **30** as the spring pack assembly **30** rotates. The tab **68** which has rotated with the spring pack assembly **30** places a bias on the retaining member **50** back to the original position. Similarly, if the latch **20** is rotated in the opposite direction, the opposite retainer member **50** and corner portion **78** will both be engaged by the opposite spring tabs **68** to return the latch **20** to its original centered position. In this manner, the mechanism is self-centering when the handles **24** and **26** are actuated in either direction.

It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. A spring apparatus for a latch, comprising:

a torsion spring including end stop members;

a square spindle member;

a housing, including:

a first housing member having an orifice formed therein configured for receiving the spindle;

a second housing member comprising a base, an integral spindle holder portion extending outward from the base forming a cavity configured for receiving the square spindle, spring retaining members extending opposite the holder portion at the periphery of the base selectively configured to engage the end stop members, and an annular member extending from the base opposite the holder portion, wherein the annular member is positioned for inserting through the center of the torsion spring, and the spring retaining members outside the torsion spring to retain the torsion spring, wherein the annular member and housing each have a center axis, the center axis of the annular member being offset from the axis of the housing nearer the spring retaining members.

2. A spring apparatus according to claim **1**, wherein the second housing member includes a base portion and a pair of side spring retaining members, wherein the second housing member is configured to cooperate with the first housing member to retain the torsion spring.

3. A spring apparatus according to claim **1**, further comprising an adapter portion extending outward from the holder portion.

4. A spring apparatus according to claim **3**, wherein the adapter portion further comprises a clip member.

* * * * *